is recorded. The author proves to his own satisfaction "that the highly complicated methods of biometry are no more reliable in their results as far as this material is concerned than other methods far less cumbersome and slavish." The nature of coloration and its ontogeny in the adult beetles and in the larvæ is discussed in chapter iii., and Dr. Tower adheres to his former view that colour originates from definite centres, and all patterns are merely extensions of these centres; all species start in life with an identical arrangement of colour-producing centres, which become modified, suppressed, or accentuated in different stages and in different species. Strong evidence against atavistic influences on the colour-development is adduced in the case of three species. Large numbers of specimens in all stages of growth were subjected to the most various conditions of temperature and humidity, and the conclusion is reached that like results are produced by diverse stimuli, *e.g.* any factor, such as heat, above or below the normal has the effect up to a certain point of producing increased pigmentation, beyond that point, of retarding it. The author believes that stimuli applied before the germ-cells begin to develop produce somatic variations only, which are not heritable; on the other hand, if the beetles were subjected to abnormal conditions when their germ-cells were sensitive to such stimuli, heritable variations resulted, and he attributes the inheritance of characters produced in the experiments of Weismann, Standfuss, and others to the fact that the stimuli acted on sensitive germ-cells, not on the soma. The subject is open to considerable argument, and doubtful critics may be referred to pp. 212–5 of Dr. Tower's monograph for a complete exposition of his views. Of high interest are the observations on the protective value of the gaudy coloration of these beetles. All the species have on the elytra and round the edge of the thorax, rows of glands whence exudes an oily and distasteful fluid; young fowls turned loose in a potato field, where *L. decemlineata* was common, eagerly attacked the insects at first, but soon learnt to avoid them, and subsequently could not be induced to eat them even when offered in company with edible insects. Specimens with the yellow stripes of the elytra covered with blackened shellac were given to experienced fowls, and then were readily seized, but as soon as their distasteful properties were realised they were dropped.

Limitations of space forbid a discussion of the experiments on selective and pedigree breeding, but they are of much interest and of great importance; the experiments extended over several years, but were brought to an abrupt conclusion through the carelessness of some workmen; Dr. Tower has with indomitable perseverance recommenced them, and his final conclusions will be awaited with eagerness. In the last chapter Dr. Tower confesses the faith that is in him; he will have none of the "Weismannian id-biophore-determinant hypothesis." He puts his finger on the weak spot in the theory of de Vries, and asks how mutants fare under natural conditions; his experience with Leptinotarsa shows him that they are rigorously exterminated. Variations he regards as epigenetic, not predetermined, evolution is continuous and direct, and new species have arisen in magrating races by direct response to the conditions of existence, natural selection acting as the conservator of the race by limiting the variations to a narrow range of possibilities.

R. S.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

Cambridge.—Mr. T. B. Wood, university reader in agricultural chemistry, has been appointed Drapers' professor of agriculture in the University. Mr. Wood has been secretary of the Board of Agriculture since the foundation of the board, and the marked success of the agricultural department at Cambridge is in no small sense due to his energy and initiative. The professorship was vacated owing to Prof. Middleton being appointed assistant secretary to the Board of Agriculture and Fisheries. Mr. Wood is the author of many scientific and practical papers on agriculture, and he is co-editor of the *Journal of Agricultural Studies.*

Keith Lucas has been appointed an additional demonstrator in physiology; and F. A. Potts has been appointed assistant to the superintendent of the museum of zoology.

Demonstrations in practical physics will be given during the long vacation, commencing on Monday, July 8. The chemical laboratory of the University will be open for the use of students during the months of July and August. Notice is also given that during the month of July, Mr. Fearnsides will deliver a course of elementary lectures on "The Study of Rocks."

An examination for one "Surveyors' Institution Scholarship" will be held on July 24–27. The scholarship will be tenable for three years, and of the value of 80*l.* per annum. Candidates will be examined in (*a*) elementary chemistry and physics; (*b*) more advanced chemistry, physics, botany, and geology.

Oxford.—In the Convocation to be held on June 26, it will be proposed to confer the honorary degree of D.Sc. upon the following men of science, nominated by the Chancellor on the occasion of the Encænia following his installation:—Sir Norman Lockyer, K.C.B., F.R.S.; Sir Richard D. Powell, president of the Royal College of Physicians; Sir William Ramsay, K.C.B., F.R.S.; Sir William H. Perkin, F.R.S.; Prof. W. Watson Cheyne, C.B., F.R.S.; and Dr. Ludwig Mond, F.R.S.

The report read at the annual meeting of the City and Guilds of London Institute on May 28 referred to the negotiations which have taken place with the Board of Education with the view of the Central Technical College of the institute being included in the scheme for the establishment of the Imperial College of Science and Technology at South Kensington. The draft provisions dealing with the purpose and scope of the new institution, and the manner in which the Central Technical College will be associated with the scheme, have been approved by the executive committee.

As was explained in an article in Nature of May 16 (p. 56), the new Imperial College of Science and Technology is shortly to be incorporated in accordance with a charter which is to be considered immediately by a committee of the Privy Council. The suggested charter provides for the continuance of the Royal School of Mines and of the diploma of Associate of the Royal School of Mines, and the Central Technical College is to retain its individuality and to continue to exercise its privilege of awarding its diplomas of associate and fellow. A question was asked in the House of Commons on May 30 whether, under the proposed charter, it is intended also to retain the title and associateship of the Royal College of Science. The President of the Board of Education replied that the new governing body when established will consider the question and decide whether it is expedient to continue the name Royal College of Science and its diploma, and to secure to present associates of the college their existing privileges.

The Imperial Department of Agriculture for the West Indies has established agricultural schools at St. Vincent, Dominica, and St. Lucia, and the result has been to provide a good practical training in agricultural science to a selected number of boys. Instruction is given in the theory and practice of agriculture and in agricultural botany and chemistry, in addition to the subjects of an ordinary education. Each boy receives daily training in raising the crops under cultivation and in the care of livestock. At each school a portion of the land is divided into experiment plots for testing varieties of different plants, the introduction of new plants of economic importance, and methods of controlling insect pests and fungoid diseases by insecticides and fungicides. Besides these facilities, the *Agricultural News* of Barbados reports that rabbit breeding is taken up, and pure-bred Belgian hares have been introduced in order to improve the local stock. Poultry raising also receives attention, and now, by the use of incubators, a good supply of well-bred chickens is available for disposal throughout the different islands. The pupils become acquainted with all the details of work in the field before the theoretical knowledge of science necessary for keeping abreast with agricultural progress is learned. It has been found that the blending of practical

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experience with theoretical knowledge is the most desirable method of producing young men qualified to take up responsible positions.

THE first annual conference of the Association of Teachers in Technical Institutions was held at the University of Leeds on May 22 and 23. The president, Mr. V. A. Mundella, of the Northern Polytechnic Institute, London, occupied the chair, and about one hundred delegates were present. Mr. Graham, secretary for higher education in Leeds, said that one of the great difficulties from an educational point of view, especially where it is wished to give students an all-round view of their particular calling, is that of the technical teacher teaching a bread-and-butter subject. If teachers could be convinced that it is absolutely necessary that the pupils should understand the scientific principles underlying that subject and get an all-round view of their particular trade, and not one particular little picture of it, a very great service would be done to technical education. In his presidential address, Mr. Mundella directed attention to the great leakage represented by the passing outside the pale of educational effort of children beyond the age of twelve, and he urged that up to the age of seventeen secondary education, widely diversified to meet local conditions, the standing of pupils, and the wishes of parents, should be made compulsory. There would thus be a perfectly natural development of the child. Scholarships, he said, do not meet the requirements, and grammar schools and public schools have no effect on the problem of secondary education, which is the provision of suitable schools for the 600,000 children who leave the present elementary schools. The examination system for scholarships is fundamentally wrong, besides being very expensive. It works out for the whole country at about 20*l.* per scholar on the average, a sum almost twice as great as would maintain the child in a provided secondary school belonging to the local authority. Mr. H. A. Clark, head of the engineering department of the Northern Polytechnic Institute, read a paper entitled "Notes of an Educational Visit to the United States." He referred to the brotherly feeling between English and American men of science, and described his journey through the States and the various institutions visited. Mr. Barker North, chairman of the West Yorkshire branch of the association, read a paper on the preliminary training of technical students. He condemned the preliminary training of students entering technical colleges as very inefficient, this being in the main due to the desire of educational committees to secure large classes, paying inadequate attention to the training of the students, and unmindful of the fact that it was better to produce six highly-trained men than six dozen inefficiently trained. A paper by Mr. J. Fitzgerald, of the South-Western Polytechnic Institute, and Mr. E. L. Bates, of the London County Council School of Building, Brixton, on syllabus and examinations as applied to building subjects, was read by Mr. Bates. At the outset Mr. Bates referred to the impossibility of one individual becoming proficient in more than one craft. He also dealt with the best course of technical instruction for the craftsman and the general foreman. Several discussions of an instructive kind followed the reading of papers.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, February 14.—"On the Specific Inductive Capacity of a Sample of Highly Purified Selenion." By O. U. **Vonwiller** and W. H. **Mason.** Communicated by Prof. Threlfall, F.R.S.

The paper contains an account of the application of methods of measurement described by Pollock and Vonwiller (*Phil. Mag.*, June, 1902) to the determination of the specific inductive capacity of selenion. Two methods were employed, one an absolute electrometer method employing forces of a frequency of about fifty per second, and the other a resonance method employing electric oscillations of a frequency of 24 millions per second, which is believed to be more accurate than any high-frequency method hitherto employed. The selenion was cast into the form of a plate, 15 cm. diameter and 1 cm. thick, this plate being cast in such a manner as to ensure its being in the vitreous condition, after which it was ground with carborundum powder until the surfaces were flat and parallel. After each set of measurements the plate was broken up into small pieces, and the density of these pieces compared with that of the plate as a whole.

The following results were obtained:—

Density at $13^{\circ}.8$ C., 4·29.

Specific inductive capacity—by electrometer method, 6·13 at 16° C.; by oscillation method, 6·14 at $23^{\circ}.6$ C.

Specific resistance in the dark, approximate—between $2{\cdot}2 \times 10^{16}$ ohms at 20° C. and $6{\cdot}5 \times 10^{15}$ ohms at 25° C.

Resistance measurements were made in the dark, and it was noticed that the specific resistance fell considerably in the light as in the case of the conducting variety of selenion.

It was found that a thin reddish film forms on the surface of the selenion, though it is only exposed to air, and the comparatively high conductivity of this film gave considerable trouble before it was discovered.

February 28.—"The Enzymes associated with the Cyanogenetic Glucoside Phaseolunatin in Flax, Cassava, and the Lima Bean." By Prof. W. R. **Dunstan**, F.R.S., Drs. T. A. **Henry** and S. J. M. **Auld.**

The authors show there is reason to believe that these three plants, flax, cassava, and the lima bean, contain a mixture of the two glucosidolytic enzymes, emulsin and maltase.

The same authors had previously proved that the production of prussic acid from the lima bean, cassava roots, and the seeds or embryo plants of flax is due to the decomposition of the cyanogenetic glucoside, phaseolunatin (α-dextrose ether of acetone cyanohydrin), contained in each of these plants, by an enzyme which resolves this substance into acetone, dextrose, and prussic acid (Proc. Roy. Soc., 1902, lxxii., 285; 1906, lxxviii., 145; and *Ann. Chim. Phys.*, 1907 [viii.], 10, 118).

Since the mixture of enzymes obtained in the usual manner from any one of these three plants decomposes phaseolunatin and amygdalin, the characteristic glucoside of bitter almonds, whilst the enzyme which occurs with amygdalin in the almond decomposes amygdalin, but not phaseolunatin, it seemed clear that flax, cassava, and the lima bean must contain either a mixture of emulsin, with some other enzyme capable of hydrolysing phaseolunatin, or a new enzyme having the property of decomposing both glucosides.

Fischer's generalisation that the glucosidolytic enzymes so far systematically examined are divisible into two classes, the one capable of decomposing the α-alkyl ethers of the hexoses and the other the stereoisomeric β-alkyl ethers of these sugars, has rendered it possible to classify an unknown glucosidolytic enzyme by ascertaining whether it is active towards the α-alkyl ethers of the hexoses or towards the stereoisomeric ethers, and E. F. Armstrong has extended Fischer's work in this direction by showing that when the α-alkyl ethers of the hexoses are hydrolysed by enzymes of the maltase type the sugars immediately liberated are the α-forms, and that similarly the stereoisomeric β-ethers on hydrolysis by appropriate enzymes furnish the β-forms of the hexoses.

These methods have been applied to the investigation of the mixture of enzymes contained in these three plants and to the determination of the nature of the dextrose residue in phaseolunatin.

It was found that the mixture of enzymes has the property of hydrolysing amygdalin and salicin, which are both known to be β-glucosides, and similarly it decomposes α-methyl glucoside and maltase, which both have the α-structure.

Further, phaseolunatin is decomposed by yeast maltase and by the mixture of enzymes occurring with it in the three plants already named, yielding, in the first instance, the α-form of dextrose, so that it must be regarded as an α-dextrose ether of acetonecyanohydrin. Accepting Fischer's generalisation, it seems clear from these data that flax, cassava, and the lima bean contain at least two glucosido-

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